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PHARMACY AND CHEMISTRY AT THE WORLD'S FAIR.

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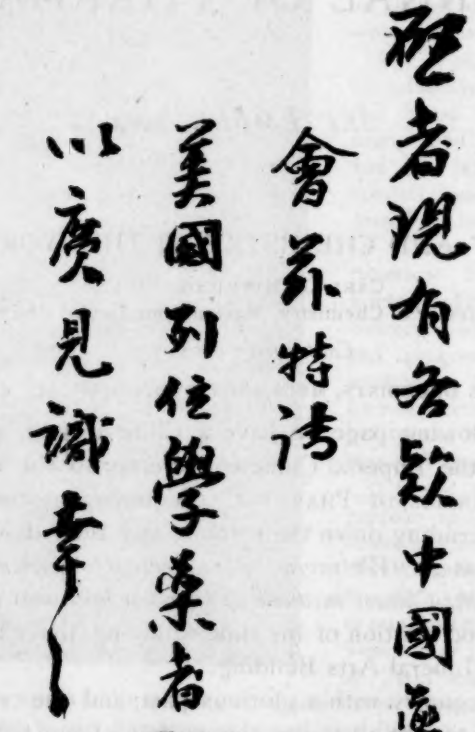
III. CHINA: ITS DRUGGISTS, MEDICINES AND CHEMICAL MANUFACTURES.

On the following page we have a Chinese note, specially written for us by the Imperial Chinese Secretary to the readers of the AMERICAN JOURNAL OF PHARMACY. Beginning at the upper right-hand corner, reading down the column, and then down the next to the left, it states: "*We invite the readers of America's oldest drug journal to see the Chinese medicines;*" and it will well repay any one to spend a good portion of his time studying the Chinese exhibit shown in the Liberal Arts Building.

China is a country with a glorious past, and the centuries of experience have taught all trades the wisdom of our trite saying that the shoemaker should stick to his last. The readers will then not be surprised to learn that the Chinese druggist states on his shop signs that he sells drugs and medicines; also, that if you should ever enter such a store, you would not find cigars, soda-water, stationery, paints or glassware, but only drugs and medicines. The Chinese druggist makes no pretensions to being a professional man, but he is a man of conscience, for no Chinese druggist sells a grain of opium to its unfortunate habitue. Would that we could say as much for our entire drug trade!

The Chinese drug-stores are similar to other Chinese shops; in size they vary of course according to the location, size of town and

importance of their trade. The entire front is open to the street during business hours; at night the shop is closed tightly with shutters so that no one may enter. About the walls are shelves, and all this space is taken up with an array of chinaware (porcelain) pots containing drugs. These pots remind one of the similar receptacles



used in the seventeenth century. They are urn-like in shape, and are closed with a porcelain lid. A counter, upon which all drugs are cut, weighed out, wrapped up and sold to the customer, has a prominent place. There is also a desk, where we find the scrupulously kept account books, writing material and the ever-present Chinese counting-board. So expert and rapid is the Chinese calcu-

lator on this board that the English banks at the treaty ports have such men check up the intricate problems of Chinese fluctuating currency into British pounds and pence after the English cashier has made his estimate. If there be a discrepancy, it is found that the Chinese is right. This board consists of about ten rods, each having seven sliding balls, two of which are above a wooden partition and five below; by sliding these up and down the calculator does the most difficult of additions, subtractions, multiplications and divisions.

We might almost say the appliances and apparatus of the druggist are his deft hands, from the very few aids he uses. Upon the counter is a lever-knife similar to our plug-tobacco cutter; this is firmly fixed to the table, and he cuts his roots, barks, etc., with this. Hard drugs, such as betel nuts, are opened up by a peculiar triangular knife blade. The mortar is not like ours; it is made of bronze or iron, and looks like the water-holder found on many grindstones. In length it is about 2 feet, in width about 2 to 4 inches; this trough has an elliptical grinding surface. Playing in this is a wheel of metal having an axle; the projecting axle is firmly grasped. With a pressing forward and backward motion, a thorough pulverization is possible. To remove oil from contused seeds and to strain oils they use the bibulous Chinese paper.

The Chinese grain measures are bronze-bound tubs, the throat being contracted, affording a more accurate stricken measure than we practise here in the West. Chinese liquid medicines kept and sold in shops are few; so they have no need for measures, but only appliances for weighing.

The appliances for weighing are two; the common equal-arm balance for fine weighing, drug and specie, and the steelyard, used for less accurate and heavy commercial work. The steelyard is the common Chinese balance. It consists of a wooden rod, at one end of which a bronze pan is suspended by four strings; near this are either two or three string supports, each used according as to whether heavier or lighter weighing is to be done, while beyond is the scale marked in golden Chinese characters. There are as many scales as there are string supports. The equal-arm scales are built similar to ours; they have the pointer playing upward, are nicely adjusted, and they keep the pans at rest by sliding a wooden block underneath them when not weighing.

Weights are made in two qualities: the common kind, used on the steelyard, are of iron, and are suspended therefrom by means of a string tied about the knob at the top of the cylindrical body. These weights are similar to our knob weights in form. The fine quality, used for weighing specie and drugs, are made of bronze. These are finely polished, similar to a figure 8 in form, only very slightly contracted in the centre; they are about as thick as they are broad.

As the standard of weight depends on the fact that the standard Chinese currency is silver, which is only worth its bullion value for all important commercial transactions, and, consequently, is weighed, and, as their weights have the same names as the divisions of the currency, I give a table of these coin values.

10 cash equal	1 candareen.
10 candareens equal	1 mace.
10 maces equal	1 tael.
12 taels equal	1 pound avoirdupois of silver.

So we see their standard coin is the tael, and this is their unit of weight. Weights of 10 taels down to the mace are made of bronze; the 1 mace and subdivisions thereof are made of small thin blocks of ivory. All weights have the imprint in Chinese, indicating their value.

The prices obtained by the druggist vary very much, a small pot of eye-paste to clear the vision brings about 6 cents; an ounce pill, gold coated and encased in wax, may bring several dollars, while the Chinese panacea, the native ginseng, brings its weight in gold.

It is the usual thing to find a physician, who has gained a reputation, in each drug store; he is not connected with the store management proper, but the druggist finds it to his trade interest to have a desk for the physician in his shop. The consultation is somewhat on this order: The patient comes, he is very carefully examined as to pulse both of the right hand and the left, this may take ten minutes, then follows a searching examination of the eyes, tongue, etc. A prescription is now written and the patient hands this to the druggist. It may call for a standard pill or a complex prescription of animal and vegetable drugs; all is carefully weighed out separately and wrapped up for the patient. At the home this is mixed according to the directions given, and an infusion thereof made. The druggist does not retain the prescription.

The Chinese materia medica is like that of the times of Lemery; the vegetable drugs are the most abundant; of course, there are also very many animal drugs of all kinds, while the inorganic chemicals and the fossil shells, animals and the like, are of least importance. There must be over a thousand drugs exhibited here. Many are in our own materia medica, such as rhubarb, valerian, veratrum nigrum, liquorice, several varieties of galls, safflower, melon seeds, blistering flies, calomel, alum, copperas, sugar, honey, wax, etc. We give a number of each kind of drugs and the uses to which they are put.

Drugs from plants are many, and the most important is ginseng. By Tong Shan we mean ginseng, the kind that grows in the northern and highly favored Chee-Lee province, and not the cheap American product known as Yeung Sum by the Chinese. The genuine ginseng is much larger and plumper than that grown in Kentucky; and no Chinaman that has the price would take the American product if he could get the Chee-Lee province brand. Tong Shan brings more than $100 a pound in China wholesale, and as it "allays excitement, increases secretions and the flow of saliva," it is certainly worth it. The American ginseng is also a "sialagogue, relieves thirst and is a cooling medicine," but it is worth only a little more than $5.00 a pound in Canton.

Tai Wong is rhubarb; it is used for jaundice, dropsy and dysentery.

Fu Pak or amber is specially indicated in cases of fright of children, and is used in nearly all remedies designed for child sickness.

Mut Yeuk is myrrh, it dissipates effused blood and cures pain.

Pung Lung Fa is the betel-nut flower; this is an expectorant and intestinal remedy.

The so-called lotus nuts are round brown-coated kernels with white meats, and nearly ¾ inch in diameter.

Beautiful thin white sheets of paper cut in squares about 3 inches across, as obtained from Aralia papyrifera, are shown.

What is the most striking in this exhibit are the many animal drugs; you feel as though you step into the past of our pharmacy; that you read from the pages of the old Pharmacopœia Augustana, with its many queer drugs and the interminable Theriacæ Andromachi, its Classes Mithridatii Damocratis, and its gems, fossils, snakes, etc., used at that time, only two centuries ago. The Chinese are fond of boiling things up with water, and they show many animal glues.

Cow glue and chicken-blood glue are used. Tiger-bone glue cures rheumatism, and was stated to do wonders by the European in charge. Tortoise-horn glue relieves heat of blood, dryness of the mouth and thirst. Luk Káu (also Lu Chiao), deer-horn glue, is a tonic, increases the semen.

Bones of the various animals are used. Sing Yuen, antelope horns, relieves the heart, liver and lungs. Sai Kok, hippopotamus horns, removes the impurities from the blood, abates the heat of the heart. Kuai Pan, tortoise shell, is a tonic for the blood of young people.

Of things that crawl and hop, I found: the Ki Li Kwai lizard (frog) was good for dysentery; Ki She, a snake, cures rheumatism in limbs and fingers; Kop Kai, lizard, is an aphrodisiac; Ti-lung, earthworm, regulates menstrual discharge and relieves colic. The bile of three kinds of snakes is an expectorant and carminative. I also saw Ch'an Su, or toad-spittle cakes; they exercise the toads, thereby obtaining the fluid that they are well known to discharge, this is dried and formed into cakes about 2 inches across and ¼ inch thick, the cakes are brown and have a white spot in the centre from manipulation. Two beautiful jars of dried frogs are shown. Some very fine centipedes, 4 inches long, of many joints, each joint having a pair of legs. The back of all joints, except the head and first joint, are black on the back, these are of a fine orange tint, likewise all the legs and the breast. If you examine the jar of scorpions you will distinguish their form as that given in many patent medicine calendars as part of the zodiac. These are not in as perfect a state of preservation as the centipedes; are rather deep brown in color, about 2 inches long and almost all legs.

There is nothing buggy about the Chinese, still you find many bugs shown as medicine; such are beetle skins, Ch'an Pui or cicada skins; Chin Chan Hua, locust-like bugs; tree bugs, like those flying about our electric lights; earth beetles, very much like the humble tumble bug; fine specimens of the Chinese blistering fly; a Hung Paw Mao bug from Tien-tsin; these are an inch in length, having a reddish breast and black back. What these bugs are used for I did not find out.

Feng-fang is a wasp's nest, a jar of fine quality is shown.

Fossilized remains of prehistoric animals are also shown. There is a jar of "fossil shells," they are trilobites; also some fossil crabs

in another jar. Dragon teeth and bones! Lung Nga is Chinese for dragon teeth; they "quiet the mind and heart, cure tumors in the neck of adults and fright in children."

The Chinese make some fine chemicals of apparently highest purity. White alum from Hankow is pure white in color and we could distinguish octahedral terminations. Vermillion from China has long been considered to be the best made, by painters; a fine jarful is exhibited. Calomel of good appearance also comes from Hankow. Sulphate of iron, also there called green alum, fills several jars from Siufu and Cheefoo.

Of minerals used in medicine I found iron pyrites and realgar, the latter, the red sulphide of arsenic.

CHINESE PHARMACEUTICALS.

Practically the only liquid preparations made are the infusions, and these are always made in the patient's home. Alcohol, vinegar, glycerine, ether and the like are not used in the native Chinese drug store as solvents. The only liquid preparations found are medicated oils. Ointments, pastes, pills galore, powders, simple and compound, are practically the only preparations made. They are highly advanced along patent medicine lines, fine advertisements extolling the peculiar virtues of preparations are gotten up.

Chinese pills are not like the nice little sugar-coated American product, but they stand in a class of their own. There is nothing small about these Chinese pills, they are great; not only are they elegant in appearance, but often of such generous proportions that they weigh an ounce. Fortunately for the Chinese, they do not swallow them whole, but cut them into as many pills as is desired by their physician. The Chinese pill is a bolus carefully rounded and of the usual consistency of a pill mass, the dearer pill is coated with gold leaf to preserve it, but, as even with such treatment the pills would harden, the Chinese druggist gets in his peculiar ingenuity and encases the entire pill in a beautiful wax coat. Such pills retain their original freshness for a great length of time. When you buy the pill at the druggist's he will remove this wax coat, then weigh the pill, and you pay accordingly. Some pills are sold by number, but the usual practice is the above. To give an idea as to their pills I copied the following in the exhibit:

"Seven Precious Ingredients Im-Tam Pill," a tonic for the Ming-Mun (small of back between kidneys).

"Hung Sing Cham Chung Pill," used for loss of memory from overstudy.

"Eight Genii Old Age Pills," a tonic for the promotion of long living.

"Aloes Pills" cure heat of lungs and colic pains.

"Triple Compound Tonic Pill" warms kidneys, aphrodisiac.

"King Pu Fu Tsim Pill," tonic for the legs.

"Fifteen Times Prepared Tsing Ning Pills" cure heat from damp, purgative.

"King Ngok Yan Kwai Pill," tonic for right kidney.

"Ginseng Tonic Pill," useful for debility, spleen and liver.

"Chi Pak Pat Mi Pill" will cure excess of venery.

"Hak Shik Pills," sulphur pills, fever.

Powders are also prepared and sold as such by our Celestial brother, and we may mention the "Voy Yeung Sz Yik Powder" that is used in general weakness. "Tit Ta San" (falling bruise powder) cures scalds, burns and wounds.

Charms are not foreign to Chinese practices, the "Ka Nam Pik Yik Heung Chu" is a renowned charm against epidemics, is made in strings of eighteen beads and worn on the left coat collar. This charm costs $2 per string of eighteen beads.

Ointments are made and sold by the druggists. The "Shea Heung Siu Leuk Ointment" cures scrofula, ulcers and swelling.

The making of infusions is the favorite mode of medication, undoubtedly the very general practice of tea-growing and drinking is cause for this popularity. In general all simples bought at the shops are made into infusion by the Chinese, even the ofttimes complex mixtures of the Chinese doctor's prescription, bought and weighed out separately by the druggist to the holder of the prescription, are taken home, mixed and infused for the patient. They have one that would undoubtedly be of great value in this country; it is the "Infallible Voi Tsun Tea" that cures indigestion.

Omega oil is not in it with the U-E-Yan (As you wish oil). This can be taken internally and also applied externally; it is a great seller in Canton, being an infallible oil for all diseases, headaches, etc. The Europeans take kindly to it.

I believe there is a golden medical discovery exploited in the United States, the large firm of Kwong Chi Koon has a seller in "Sing Po Golden Prescription" that is "useful in loss of voice and

injury of liver." This firm is located in Canton, and all the pills and preparations mentioned above, shown in this exhibit, are of their manufacture. About a hundred Chinese and Europeans find employment with this firm.

MANUFACTURES INVOLVING CHEMISTRY.

In southern China the buffalo is the beast of burden, in the north they have the horse. These animals are used in many oil mills to move the rollers. The wind is harnessed up in a peculiar manner; they make a large horizontal wheel, on the periphery masts are erected, from these large sails are hung. Such mills are especially used to hoist water. Coolie labor is cheap in the East, they use it in treadmills, carrying goods and the like.

Machinery is of secondary importance in China, still they have some crude appliances. Edge runners working in a groove propelled by the beasts of burden are used to crush oil-bearing seeds. These runners are not hung in pairs as is customary in our country, but only single; to the extension of the axle the animals are hitched.

Horizontal burr-stones are used in the manufacture of rice flour, grinding of seeds for making vegetable oil and tallow. The upper stone is movable, on the periphery a vertical axle is fixed, to this a long pole is attached, this is supported by a rope tied to the ceiling. The native pushes and pulls on this pole or crank. A hole in the stone permits the continual feeding of rice.

Tread-hammers are used in the compressing of vegetable tallow into firm cakes. These hammers are heavy affairs mounted on an axle near the operator; by alternately stepping on and off he raises the hammer and lets it drop.

For expression of oil enormous wedge-presses are used. These are horizontal, the crushed and warmed seeds are placed in circular iron hoops, a circular timber fits in the hoops, wedges are forced behind this piston. Huge mallets swung from the roof give the necessary power for this.

Heating is commonly done by direct firing of the tubs, pans, etc. The fuel almost exclusively used is straw and wood. Large furnaces are used in the manufacture of the celebrated "chinaware" or porcelain. Such furnaces are shown.

Filtering or straining is commonly accomplished by using the bibulous Chinese paper.

Lime burning is not done in kilns or shafts but upon platforms. These platforms are perforated metal sheets; separating this from the firepot is a brick wall. The fuel—straw and wood—is placed in a lower pit, the hot air is led up through the perforated platform; a pure grade of lime results.

The Chinese were the first to make porcelain. They made the so-called "chinaware" a thousand years before the Germans succeeded in stumbling upon the process. This is an enormous industry. In the Imperial Chinaware Works, at Kiu Kiang, there are over 3,000 kilns and a small army of workmen. It is at this place that the celebrated kaolin, also called mingsha, or china clay, is found. Beautiful snow white bricks of this kaolin are shown, as are also some thirty fine pigments used in the coloring of ware. A small model of the manufacturing plant is shown, and here is also seen the potter's wheel—the only machine that has not been improved upon for the last 4,000 years. The mixture used is kaolin and feldspar, the latter serving as a flux. Some very fine samples of finished ware are shown.

Salt is extracted from salt earth, or mud, obtained at the mud flats along the sea coast. This is heaped upon tubs, the bottom of which has filtering material, as bits of bamboo, and also a draw-off. Water thrown on this heap gradually trickles through, leaches out the salt and runs into a sunken tub. From this the brine is bailed out, placed in a large evaporating tub, fired from beneath, and evaporated down. The Chinese make salt of snowy whiteness. It is usually brought into trade rather coarse; also salt that is used for animals, of a white fracture, but rather black surface.

In dyeing they use hot dye baths, express the excess of liquor by rollers, hang the finished product on elevated bamboo poles in the yards.

Sesame oil, linseed oil—used as we do salad oil—walnut, teaberry, rapeseed, groundnut oil, wood oil and vegetable tallow are expressed. The most distinctive is the manufacture of the vegetable tallow. A vegetable tallow is made from the seeds of a castor-bean plant; but the finest is expressed from a kind of white, tallowy, stringy fungus that grows on certain trees. This fungus coats the limbs to about an inch in thickness. It is removed, first run through the edge runner mill, then ground finely in the burr stone, following which the comminuted mass is warmed over the fire; it is then packed in

the iron hoops very tightly and placed in the wedge-press. The liquid fat is caught, placed in molds and thoroughly pounded into shapes by the tread hammer. This vegetable tallow is very hard, and as the process is complicated and difficult, also as the great standard on oils (Lewkowitsch) does not mention this manner of obtaining the vegetable tallow, it is interesting; he mentions only the castor-bean product.

Swatow is the centre of sugar manufacture in the south. To express the cane, they have large upright revolving pillars; these are revolved; the force is supplied by buffaloes hitched to the end of a long timber working at the top of the pillars. A native feeds the stalks one at a time on one side; the juice exudes, runs into a sunken well, at the base of the rollers. The juice is carried into the evaporating-house in buckets; here, over the free fire, it is concentrated; naturally, the sugar so obtained is rather yellowish in color. Some samples that would here be called a rather poor grade of gray sugar are labeled white sugar.

It would not do to say nothing of the curse of China—the opium habit. In the Yunnan province, also in Sechuan province, in Southern China, opium is grown; this is near India. Samples of opium in little jars, as prepared for smoking, are shown; also some as sent into the drug trade. The latter is done up in rectangular parcels of brown paper, tied with hemp twines a number of times. The saloons of China are the opium houses; some streets have one of these on every corner; but this traffic is on the down road, as the government is gradually running these dealers out of China. It is only in those towns, such as the treaty ports of Southern China, that this practice is carried on to any great extent, and that mainly among the coolies.

PERIODICAL REVISION OF DISPENSING PHARMACIES.

By M. I. Wilbert,
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At the coming meeting of the American Pharmaceutical Association it is quite probable that the proposed "National Bureau of Medicines and Foods" will be brought forward once more for discussion, with a view of securing the endorsement of the association in favor of its proposed objects.

While there is much to be said in favor of such a bureau of control, it, of itself, would not, and, under the most ideal system of administration, could not control the efficiency and purity of medicines as dispensed to the sick and the ailing on physicians' prescriptions. It is quite probable that the members of the House of Delegates of the American Medical Association appreciated this fact, for, as is now well known, that august body, after considerable discussion, refused to concur in the recommendations of a special committee to endorse the inauguration and proposed objects of the "National Bureau of Medicines and Foods."

The objects of the proposed bureau, as enumerated in the report of the committee of the American Medical Association, are as follows:

(1) To relieve physicians, pharmacists and the public of all doubt as to the composition or standards of identity, purity, quality and strength of such drugs, medicines and foodstuffs as may be submitted to and be found acceptable by a competent board of ten experts.

(2) To furnish to physicians and pharmacists, and to others who may be interested, accurate and reliable information concerning articles submitted to the bureau for its supervision.

(3) To certify to the standards of identity, purity, quality and strength of such articles as may be determined to be worthy by the board of experts and of no others.

(4) To relieve the physicians, in the manner outlined, of the doubt and uncertainty as to the nature, composition or reliability of the medicines which they are requested by representatives of various houses to prescribe or to employ.

From this statement of the objects of the bureau, it will readily be seen that there is absolutely no provision for following up the various drugs and preparations that have received the endorsement of its board, nor is there any limitation as to where or how the various preparations are to be handled or dispensed.

As is well known, many drugs and chemicals, and nearly all galenic preparations, deteriorate on keeping. This deterioration is, perhaps, not so much due to the element of time alone as it is to general atmospheric conditions and the lack of technical knowledge or care in storing the various substances.

This question of drug deterioration, while it is a matter that is generally recognized, has received but comparatively little attention

in this country, and is usually lost sight of, particularly in discussions on the improvement of drugs and preparations.

In addition to drug deterioration, there are a number of other factors that should be taken into consideration in connection with the dispensing of medicines on physicians' prescriptions.

Among these we may cite the position and general condition of the dispensing department of the drug store; the accuracy and also the sensitiveness of scales, weights and measures; the presence or absence of authoritative works and works of reference on the Materia Medica; the presence or absence of the necessary apparatus to properly test and identify the various drugs for which such tests are known; and last, but not least, the nature and extent of the probity, technical knowledge, training and general ideals of the proprietor or manager of the pharmacy or store.

Any rational individual must admit that, no matter how excellent a material may be when it leaves the manufacturer, there are still numerous chances of its becoming worthless, if not positively dangerous, through carelessness or neglect, before it reaches the consumer.

It is for these reasons that the proposed "National Bureau of Medicines and Foods" cannot be considered far-reaching enough in its objects to benefit the physician and the pharmacist; but might, on the other hand, by giving a false sense of security, be positively harmful in its influence, by delaying, if not preventing, improvements along more desirable lines.

It would be reasonable to suppose that if, instead of one bureau more or less closely connected with manufacturers and wholesale dealers, we had a thousand independent investigators constantly on the lookout for materials that did not correspond to certain well-known requirements, that the consumer would be at least as well, if not better, protected from adulteration and fraud, and that, on the whole, he would be getting better service, and, at the same time, would be fostering a spirit of investigation in a more or less competitive way.

In this connection it may be said that it can hardly be supposed that we have arrived at that stage of our development when all scientific work can be entrusted to institutions especially devised for that particular field of investigation. There always have been, and there always will be, men who are especially gifted in certain direc-

tions; but it is folly to assert that it is possible to institute a certain line of work and to constantly have at hand men who are experts in that particular field for the asking.

If we, in this country, desire to make rational progress in the field of medicine, we must endeavor to keep the practice of medicine, and all that pertains to it, free from any possible taint of commercialism, and at the same time endeavor to build up, in all the branches of medicine, a spirit of rivalry for honest scientific investigation and work that will produce exceptional men for the exceptional cases and places as they occur.

In the field of pharmacy this may perhaps best be done by promoting a line of dispensing pharmacies that are independent of and free from the spirit of commercialism to which so much exception is being taken at the present time.

For this purpose an innovation that would be of advantage, particularly to such pharmacists as are willing to conduct their shops along professional lines, would be to institute a periodic and systematic revision or inspection of dispensing pharmacies, very much the same as is done in some of the European countries, particularly in Germany, at the present time. Such an inspection could be made in a number of ways—it might be entrusted to a state or to a local board of pharmacists—or, and this I believe to be the more rational scheme, it might be entrusted to a committee composed of physicians and pharmacists under the authority of the local county medical societies.

To prevent any suspicion of this idea being original with me, I should like to state that some eighty-three years ago, when the Philadelphia College of Pharmacy was founded, the apothecaries and druggists of the city of Philadelphia and the surrounding districts resolved, or rather proposed, "that the whole profession should form themselves into a society for the twofold purpose of providing a system of instruction for their apprentices and subjecting themselves to regulations in their business."

It appears that the latter portion of this proposal was allowed to lapse, largely, perhaps, due to the fact that at that time there were comparatively few dispensing drug stores in the city, and that the system of regulation, or inspection, as was then proposed, met with considerable opposition on the part of druggists whose business was largely devoted to the sale of paints, glass and dyestuffs. The

proposition was not lost sight of, however, and was brought up, from time to time, by the more advanced and progressive pharmacists who were members of the college.

Among these, Daniel B. Smith, who was the third president of the Philadelphia College of Pharmacy, was a warm advocate of professional pharmacy, and also of systematic inspection of the several stores. In an address, delivered to the first class to receive the degree of Ph.G. (A. J. P., vol. 1, page 243), in referring to the needs and wants of pharmacists, he said: "Before we can assume to compete with kindred institutions of the Old World, our system of scientific instruction must be extended to other branches of natural history, and rendered more thorough and minute in those which are already taught. Our members must be willing to subject the contents of their shops to periodical scrutiny by impartial and competent judges. The College must exercise a vigilant police over the market for drugs, and over the weights and measures used in the administration of medicines."

While it is true that none of the colleges of pharmacy in this country have ever essayed to comply with the high standard of excellence outlined by Daniel B. Smith, in his address, they did, during the first decades of their existence, contribute materially to improve the quality of the drugs and medicines sold in the cities along the Atlantic Coast.

As is well known, it was not until 1848 that Congress passed a law, which is still in operation, to prevent the importation of grossly adulterated or sophisticated drugs and medicines.

Much of the credit for bringing about this desirable piece of legislation is due to the then newly-organized American Medical Association. This association at its first annual meeting, in Baltimore, 1848, had presented to it a lengthy report on "The adulteration of drugs and medicines," and in turn adopted a spirited set of resolutions which were addressed as a memorial "To the Honorable Senate and House of Representatives, in Congress assembled," endorsing the bill which was then pending, to exclude fraudulent drugs and medicines from this country.

In the years immediately succeeding, reports on the adulterations of drugs and medicines were made an annual feature of the Association's work. These reports, at the present time, constitute a veritable mine of information as to the practices of unscrupulous dealers

at that time, and also indicate the marked improvement that has taken place in the quality of drugs and medicines.

From the recommendations that were attached to these several reports, I should like to quote from the report by Dr. Robert M. Huston, of Philadelphia, published in 1850 (*Proc. Am. Med. Assoc.*, vol. 3). "It is to the members of our own profession, in conjunction with the respectable druggists and apothecaries, that we must look for whatever reformation is to be accomplished.

"It has been suggested that physicians should feel it to be their duty to inspect the medicines in the drug stores from which they are in the habit of obtaining their supplies, for themselves or their patients. This would exercise a wholesome influence if submitted to by the apothecary and frequently performed by the physician."

It is this same proposition, that was thought to be impracticable half a century ago, that I believe could be put into operation at the present time, with advantage to the members of the medical as well as pharmaceutical professions.

Such a system of inspection might readily be inaugurated in connection with the work of local or county medical societies and might be made one of the requisites for pharmaceutical membership of the American Medical Association.

The local medical society could in this way control, not alone the class of drugs and medicines, but also the nature and kind of store at which it would recommend the prescriptions of its several members to be compounded. In larger cities particularly such an arrangement would be of inestimable value to the physician, as it would relieve him of any possible suspicion of favoring any one pharmacist, and at the same time give him a reasonable assurance that his prescriptions would be compounded, at any one of the recommended pharmacies, by competent men and in the best possible manner.

It is true that the requirements, at least at the start, should not be prohibitive, but they can readily be made to cover a wide field and can be made more stringent as occasion permits.

Among the factors that might be considered in this direction are:

(1) The number of stores to be recommended.

(2) The arrangement and general contents of the store.

(3) The class of analytical and manufacturing work that should be done in connection with the dispensing department.

(4) The nature and quality of the goods that are allowed to be carried as a side line.

(5) The ability, training and achievements of the proprietor or manager.

The practical application of the scheme could be made simple enough. A pharmacist who wishes to have the endorsement of the local medical society would obligate himself to conduct his pharmacy strictly in accordance with the requirements of his local society, which in turn would be subject to change and strictly in keeping with the ideas and ideals of the members of the society. The pharmacist would be subject to periodical inspections by a special committee, appointed for this purpose, and would also be subject to complaints for any violations of the stated requirements by any one of the members of the society.

The requirements made by the local societies might be controlled, in a general way, by the state or national associations so that there could be absolutely no cause for any suspicion of favoritism. A proposition of this kind, put into operation, would assure for the pharmacist who is anxious and willing to do conscientious work, the endorsement and encouragement of the better class of physicians of his city or town.

It would ensure for the physician a source of supplies that is absolutely under his control, at least so far as the excellence or the quality of the various drugs and preparations is concerned, and would at the same time relieve him of any suspicion of being interested in the shop of any one apothecary; for he would have several to choose from whose honesty and ability are subject to his censure or control. For the public such an arrangement would be of inestimable value in that it would make a distinction between the efforts of the honest, earnest and able man who is in the practice of pharmacy with a view of improving or increasing the sum total of human knowledge, as being distinctly above the ideals of the man who is willing to pose as a vendor of patent medicines and adulterated drugs, whose sole object in life appears to be to sell anything and everything, regardless of the consequences, simply and solely for the profit that accrues to him for the time being.

This latter suggests, too, what I believe to be the strongest argument in favor of some arrangement similar to that proposed above. If the dispensing of legitimate prescriptions were absolutely divorced

from the promiscuous sale of medicines and appliances, that are openly and willingly recommended and sold for questionable or even criminal purposes, physicians and pharmacists who are not willing to endorse such practices would not, as at present, be suspected of sanctioning the same by fraternizing with or patronizing the proprietors of establishments where the same are sold.

THE EDUCATIONAL QUALIFICATION.[1]

By Albert B. Prescott.

The public-school system is the heart of intellectual life at the present day. The school system cannot be considered separately from the organization of the commonwealth. The pulse of the school beats through the community, and beats by virtue of the vital force it draws from that community. To complain of the schools is to be impatient with the development of the people and with the present stage of civilization.

The people have entered upon a new order of living whereby city and country are consolidated. The farmer, receiving daily papers by rural free delivery, takes two postal cards that he may stop the one paper and start another of a different political utterance, with as much independence as he could exercise were he a candidate for the Governor's chair. He can call his family physician by telephone, or call up his druggist for further directions in the relief of a crop from the ravages of a destroying insect. The mechanic or the frugal laborer counts on the schooling of his children as he counts on the roof over their home, and watches the test of his sons in the high school as their capabilities are weighed in the common intellectual balance, under plans for the business of life and for its several pursuits.

The people themselves are adopting by a township vote the provision of centralized schools, having all high-school grades, with free transportation of all pupils to and from their rural homes. The conveyance of school children is guarded by State contract as sacredly as the carriage of the mails under contract of the Federal

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[1] A paper read before the Michigan State Pharmaceutical Association at the Grand Rapids Meeting, August 10, 1904.

Government. In Michigan the representative of the State Grange unites with the Superintendent of Public Instruction in a report upon the Centralized Schools of Ohio, looking to it that our State shall not fall behind in the march.

Such are the people of this Commonwealth, whose sons and daughters carry the numbers of high-school students, and lead in the intellectual sentiment of high-school classes. Already in the high-school grades they nourish the pride of liberal learning, they yield to the ambition for such a general training in the science and literature of the world's work and thought of to-day, as shall give them strength in any pursuit they may enter upon—advantage in any station they may fill.

It always seems to me, in the self-confidence of my own enthusiasm, that I could appeal to high-school seniors, in behalf of pharmacy, as a pursuit of interest and promise, a study that brings the potent materials of all the earth to the foot of man, an opportunity to draw the inventions of science into the profits of a manageable business. In the simplicity of my heart, I would like to lay the actual merits of pharmacy before a large jury of high-school graduates, many of whom are certainly wanted in pharmacy. Certainly, I say, there are places waiting for them, these young men whom I seem to see before me, the students who have won out in the four-years' race of the general studies of the high school, if I as a stranger could get their attention to the real merits of pharmacy as a pursuit.

But these students, whom we are supposed to address, look one to another, and fall back upon what has happened among their former classmates, in the events known to their parents, and well known in the neighborhood at home. Fellows whom they know went before the State board after working in a drug store, and were given State examination in this same pharmacy. Fellows who couldn't pass to the third year of the high school went before the State board. Tom Jones, poor boy, never had a chance to finish the eighth grade, but he has taken the board examination in pharmacy, and the drug-store man thinks he can pass it next time. Yes, they have a State law, and a standard of knowledge and so forth, all going to show that high-school work is not in it. If they want high-school work why don't they stand up for it? I would rather go into a hardware store, where they don't set up for any studies in particular, than to go in on the grammar-school grade. This is

what they say to themselves, to each other, and to their parents, about pharmacy.

It is against such discouragements of low standards, and by virtue of the innate merits of pharmacy itself, that a good number of students of full college preparation still enter upon thorough courses of pharmaceutical study in university schools.

When I received the circular letter of Dean Searby, of the University of California School of Pharmacy, a few weeks ago, I confess to having felt some humiliation, that he should ask the Conference of Colleges to do no more than this, to require for college entrance one high-school year in 1905–6, two high-school years in 1906–7, and so on. But upon reflection I agree with him and with others, that *any standard in general education, providing an annual advance leading up to the equivalent of high-school graduation, faithfully adopted, deserves to be supported.* To begin with, it publishes the poverty of pharmaceutical education, and opens out the danger of neglect. Let us not shrink from open confession. Evils must be seen and declared. It is not too late to begin. New York is a little in advance of Michigan in the date prefixed for the high-school requirement. In their college standards, however, the exclusive policy of eastern States is by no means to be coveted by Michigan. For the pharmacy board to require the diploma of colleges up to this time wholly destitute of an entrance standard would never be a matter of pride in this State. We have set a better example for fully twenty years. To this the hundreds of New York and Pennsylvania graduates of the Michigan University bear witness, as do the students of pharmacy who continue to come to Ann Arbor from the eastern States.

At present, however, I fully believe that the immediate future of pharmacy depends mainly upon the general education; that is to say, the personal quality of its recruits. Young men of real ability and ambition, those who can adapt themselves to the shifting demands of pharmaceutical business and to its fast coming discoveries, are the men *to save pharmacy* as a distinct pursuit. Pharmacy itself will educate such men. No other profession does more to educate and develop its practitioners—those capable of meeting the opportunities of the time.

As a merely mercantile pursuit, it is hardly probable that pharmacy could maintain a separate existence very long, certainly not

with regulation by State law, nor with a body of practitioners recruited from the culls left behind by the public-school system.

Education, in its fullest meaning, has been well said to lie "in the great stock of ideas possessed by mankind." Shall we have a generation of pharmacists with the capacity of *continued* education in the commerce and the research of this avocation?

It is easy to agree with Dr. Henry E. Armstrong, of London, as chairman of the Mosley Commission, in his late report upon the educational methods of the United States, that over-teaching is the tendency in certain of the more advanced professional schools, as those of medicine and law at the present. Pharmacy surely cannot be charged with this excess, and the active commercial spirit of its practice will preserve it within healthful limits. It only remains to look to the personal quality of the recruits to its ranks to make pharmacy a most representative profession in the twentieth century.

A PREREQUISITE LAW.[1]

By Joseph P. Remington.

"Is it not time that graduation from a college of pharmacy be required before registration?"

The Committee on Papers and Queries having assigned to the writer the above question, to answer becomes a duty which is accepted cheerfully. It is recognized by not only the leaders, but the rank and file, that the time has come to demand a law which will compel graduation from a recognized college of pharmacy before a license will be granted to a pharmacist applying for examination for the highest grade certificate from the State Board.

This is not a new subject, for it was bruited at the very infancy of pharmaceutical legislation in this country; but the opposition of a number of druggists in business, who were not graduates from any college, halted the movement. They seemed to be possessed with the false and selfish idea that to protect their own standing they were compelled to belittle pharmaceutical education and decry its merits; but "Truth crushed to earth will rise again." As the

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[1] Read at the twenty-seventh annual meeting of the Pennsylvania Pharmaceutical Association, June 21–23, 1904.

country has developed, and it has been fully realized that education rules the Republic, active opposition has almost entirely ceased. Our pharmacy laws, which were at first administered with the greatest leniency, have grown to be serviceable as a protection to the public against incompetency, through the examinations, which have grown in length and stringency, until now it is an exception to the rule to find a majority of the applicants passing the examinations.

With experience has come deeper knowledge. At last, but few men will be found who will say truthfully that they believe that a college education is of no value to a drug clerk. The colleges of pharmacy have had a long struggle, but have persistently held to their course, and the tardy recognition which now seems to be in sight has been won through honest, earnest labor.

The pharmacist must be a professional man as well as a business man. The commercial side of pharmacy has been enormously advanced within the past few years through the organized effort of able leaders. This improvement was badly needed. The retail druggist, a few years ago, was at the mercy of any combination of men vastly his inferiors in intellectual attainments. The pharmacists of to-day are respected because they have shown manliness, and above all, a power of cohesion and ability to stand together which has surprised the business world. Ten years ago pettiness, distrust, jealousy and ignorance of business principles were the rule. Forced, at last, almost into bankruptcy by organized bodies who reaped advantage from the lack of the business abilities of the retail druggists, the latter, roused from their comatose and terror-stricken condition, at once buckled on their armor, and, led by able commanders, soon demonstrated that they were men, and it only remains for them to heed wise counsels and march forward to continued victories.

But while this has been going on, the professional side has been neglected, or it would probably be best to say, crowded out by the immediate necessities of the commercial renaissance, and the author of the above query was evidently conscious of these facts, for it begins, "*Is it not time* that graduation from a college, etc." It is a grievous mistake to believe that the professional side of pharmacy is antagonistic to the commercial side. One supplements and helps the other. A professional pharmacist who neglects commercial training runs the risk of having no opportunity of practicing phar-

macy at all, for he fails to realize a financial return for his long and weary hours of study, even if he escapes starvation, and he who cares for pharmacy *only* as a means of livelihood and derides the advantages of education, may succeed for a time, but he soon realizes that he must employ men who have this knowledge, to enable him to keep pace with the march of progress, and with this handicap almost any other business would yield him larger returns.

The emigrant who arrives upon our shores without money, with nothing but a good constitution, appetite and the ability to work with his hands, no sooner settles himself in some part of this country before the truth is forced home to him that, while it is too late for him to acquire an education, his children must have this boon, and he slaves from morning until night to educate his family, and who has not seen the pride and joy in the face of such a father at the time of the graduation of one of his children from school? There is no feeling of jealousy in his heart. He frankly says: "My boys shall do better than I have done." Why is it not possible for the old-time druggist to look upon his children and adopted children—the boys in the store—in the same light, and say: "I did not have the advantage of a college education, but I am going to help the young fellows to the best of my ability to get what I was unable to have myself?" Thousands have done this in the past, and tens of thousands are doing this now. Let us all hope that it will be a short time before all will range themselves on the side of education and progress. This is the spirit which has put this country in the foremost rank among nations; the next generation must prove superior to the present, or decadence and loss must follow.

But the present condition of pharmacy in this State is deplorable. It is possible for a young man with superficial ideas and unambitious instincts to enter a store, serve the necessary time and satisfy his employer by attending to his routine duties; but later he wakes up suddenly to the fact that he is getting along in years, that the time has come when he must have his own store, and then he thinks of the pharmacy law of the State, and says: "I must have that certificate." If he is far-sighted and well-advised, he will see at once that by far the cheapest and best course in the long run is to go to college, and by study and systematic training with a graded course of instruction, reach, in a short time, results which it would otherwise have taken him a life-time to have gained, for the simple rea-

son that the knowledge which comes in the fragmentary, hit-or-miss way, through working in a store, requires the expenditure of so much more time, and is so imperfect and full of gaps that it is folly for a young man to attempt to compete to-day with the college graduate, who, in addition to his education, has the practical experience in a drug store. Here and there it is possible to find a young man of exceptional ability, who has brains, health and ambition, who can acquire an education by the aid of books. Elihu Burritts are still to be found, but they are the great exceptions, and the only excuse possible for any one failing to take advantage of the easy and systematic method of acquiring an education by going to college is the absence of the necessary money to carry him through.

It must not be supposed that every man who attends college is necessarily better than every other man who has not had this advantage. There are those within college who have money and who waste their opportunities. Education is sometimes possessed by those who have a modicum of brains; but given brains, education and ability, and "in the bright lexicon of youth there is no such word as fail." But this proposition may be safely stated without fear of contradiction—it is impossible for any one to attend a college of pharmacy without acquiring some knowledge. He is much better off from having learned something than he who has the same ability and stays out. Our pharmacy laws have accomplished great results, but they are defective from the fact that an examination is made the sole test of one's ability. A young man comes up before a State Board and passes a few hours in the examination-room, and if he is lucky enough to have the questions suit him, he passes with flying colors, and that man goes forth deceived by the belief that he is henceforth equipped for the duties of his position. Throwing his books away, he plunges into business, and chuckles over the fact that he must be smarter than many college boys who have had to spend money at a college, and both have been handed the same kind of a certificate, for the examination has been the sole test of merit.

And still this is not intended as a criticism upon the work of the State Boards, for they have no other course to pursue under our present laws. They must depend upon examinations, and a wise step has been taken in this State by increasing the length of these examinations and requiring a practical examination with the mortar

and pestle, the pill tile and the spatula, to determine the fitness of an applicant.

In a good college of pharmacy the fierce ordeal of a final examination could be dispensed with. A good corps of instructors, whose duty it is to quiz every student in each course three times a week, can form a vastly better idea of the capacity of a student than can the most rigid examination at the end of the course. The only purpose that a final examination serves at the present time, where these conditions prevail, is to act as a stimulant to continued effort on the part of the student to keep up with his work. But, above all, in a graduated course of instruction, it is the systematic building up of an education that counts. It is an interesting spectacle to witness the process of acquiring a pharmaceutical education. When the student first comes to college, fresh from his home, he is in the raw, green, undeveloped state so often caricatured in our newspapers and magazines. Confident though ignorant, assertive yet deficient, it takes usually a year to destroy his conceit, and nothing brings him more quickly to realize his deficiencies than the continual daily prodding with questions on the lectures to which he has listened. Any one who has had experience with college students recognizes the quick, confident, elastic step on the stairway, of the first-year student as he marches into the examination-room for his first trial. How different is the step of the senior student, as he comes in with a worried look upon his face and a feeling that he does not know whether he will just get through or fail utterly. The first-year student has the spirit of the store or school from which he has come; he is confident of his ability to answer any question that is put to him, for has he not been looked up to with mystery and awe by the other boys of his town or village?

Cowper has written:

> "Knowledge and wisdom, far from being one,
> Have ofttimes no connection."

And although there may be fine material upon which to build, the boy, through his environment, has been deceived, for he soon finds that his knowledge is not of the vital, substantial kind. A young man gains, therefore, by going to college through learning how *little he knows*, for this is the first step toward real wisdom.

In looking backward for twenty years, we must all realize that thousands of young men have been given certificates of competency

by our State Boards, who were led, through passing an examination lasting two hours, into the belief that they were thoroughly equipped for their life's work. In the professions of medicine and dentistry, the laws of the State require, as a prerequisite to State examination, the possession of a diploma from a recognized institution. Why should pharmacy, having vastly more responsibilities to the public than dentistry, and in some cases even medicine, hold back from requiring the same prerequisite? As has been often said, the issues of life are in the hands of the pharmacist, and why should the Pennsylvania Pharmaceutical Association, composed as it is of the best of the profession in the State, not reach forward from this time and advocate, in season and out of season, a prerequisite law?

A resolution is on our minute books, passed many years ago, committing this Association to this prerequisite. The American Pharmaceutical Association is also on record, having passed a resolution at the Baltimore meeting, favoring a prerequisite law. Our sister State of New York passed last year a law requiring the possession of a college diploma before entering the examination-room of the State Board. A bill was introduced two years ago into our Legislature demanding this requirement; it failed to pass. With proper effort there should be no doubt of the passage of a good law for this State during the coming winter. Such a law should place the responsibility of determining the qualification of colleges to educate upon the Board of Pharmacy, and then demand that each applicant for the certificate of Registered Pharmacist should first produce his diploma before being allowed to take his examination for the license.

THE ANATOMY OF EDIBLE BERRIES.[1]

By A. L. Winton.

For the purpose of facilitating the microscopic examination of preserves, jams, etc., during the year 1901 and the early part of 1902, I made a study of the microscopic structure of a number of fruits grown in the United States, some of which are descendants of European species, others of species indigenous to America, and

[1] This paper was printed in *Ztschr. f. Unters. d. Nahr. u. Genussm.*, 1902, 5, 785–814, and is reprinted from Connecticut Expt. Sta. Report, 1902, p. 288.

during the spring of 1902, while at the University of Graz, Austria, at the suggestion of Professor Moeller, I extended the investigation as to embrace the allied fruits grown only in Europe.

Twelve were investigated in America, as follows:

The cultivated strawberry (*Fragaria Chiloënsis* Ehrh.).
The American field strawberry (*F. Virginiana* Duchesne).
The American red raspberry (*Rubus strigosus* Michx.).
The black raspberry (*R. occidentalis* L.).
The blackberry (*R. nigrobaccus* var. *sativus* Bailey).
The dewberry (*R. villosus* Ait.).
The red currant (*Ribes rubrum* L.).
The black currant (*R. nigrum* L.).
The American gooseberry (*R. oxyacanthoides* L.).
The European gooseberry (*R. Grossularia* L.).
The American cranberry (*Vaccinum macrocarpon* Ait.).
The huckleberry (*Gaylussacia resinosa* Torr. and Gray).

Three were studied in Austria, as follows:

The forest strawberry (*Fragaria vesca* L.).
The European raspberry (*Rubus Idaeus* L.)
The mountain cranberry (*Vaccinium Vitis Idaea* L.).

Although the primary object of this work was to secure data for use in the detection of inferior fruits, foreign seeds and other adulterants in fruit products, other points of scientific interest have not been overlooked.

The writer desires to express his gratitude to Prof. Dr. Josef Moeller, Director of the Pharmacological Institute, Graz University, for kindly advice and criticism; also to Mr. W. E. Britton for aid in tracing the origin of American fruits. The cuts were reproduced from the author's drawings by F. X. Matolony, of Vienna.

THE STRAWBERRY.

The varieties of strawberry cultivated in Europe are chiefly improved forms of *F. Chiloënsis* Ehrh., but some are said to be hybrids of this species with *F. vesca* L. or *F. Virginiana* Duchesne. In many parts of Europe, however, the small but delicious wood strawberry (*F. vesca* L.) is consumed in larger quantities, both fresh and preserved, than the cultivated sorts.

Bailey[1] classifies the strawberries of North America in three

[1] The Evolution of our Native Fruits. London, 1898, pp. 428–432.

groups: (1) the Virginian group, including *F. Virginiana*, the common field and meadow strawberry of the Eastern States, with its varieties; (2) the vesca group, including the Old World strawberry and the American form, called by Porter *F. Americana;* (3) the Chilian group, to which belongs the Chilian species with all its cultivated varieties, and the North American species, native of the Pacific Coast, with its varieties.

In Colonial times the wild, or Virginian, strawberry, with its several varieties, was cultivated in American gardens, but of late years has been supplanted almost entirely by the numerous derivatives of the Chilian species, although wild strawberries are still gathered in considerable quantities in the meadows. *F. vesca* grows in the northern part of the United States, but is not so common as the Virginian species.

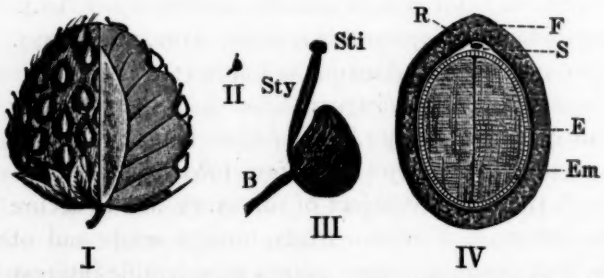

FIG. 1.—Strawberry. I Compound fruit, × 2. II Achene, × 1. III Achene, × 8. Sty, style; Sti, stigma; B, connecting bundle. IV Achene in transverse section, × 32. F, pericarp; S, testa; R, raphe; E, endosperm; Em, embryo.

Macroscopic Structure.—The cultivated strawberries (*F. Chiloënsis*) are usually of large size (often 3 to 5 centimeters in diameter), and bear the achenes in deep depressions.

Berries of the wood species (*F. vesca*) are of small size (seldom over 1 centimeter in diameter), and bear the achenes in shallow depressions.

Berries of the Virginian species are of about the same size as the wood strawberries; but like the cultivated berries, the achenes are deeply sunken in the receptacle.

The receptacle, the edible part of the strawberry, consists of a somewhat fleshy pith, a still more fleshy cortex, and between the two a narrow zone of fibro-vascular bundles, from which branches shoot off through the cortex to the achenes. (*Fig. 1*, I.)

On the surface, the receptacle has a tufted appearance, due to the somewhat regularly arranged depressions occupied by the achenes. The epidermis is sparingly pubescent.

The achenes are ovate, pointed, about 1 millimeter long (*Fig. 1*, II and III). Each is attached to the receptacle a little above its base, and contains a single anatropous seed, which is described as "exalbuminous," since the endosperm is not evident under the simple lens. The style (about 2 millimeters long) arises from the ventral side a little above the point of attachment.

The pericarp is hard and comparatively thick; the testa soft and thin; the embryo minute (*Fig. 1*, IV). When the fruit reaches maturity the calyx is still green and leaf-like, and the stamens are

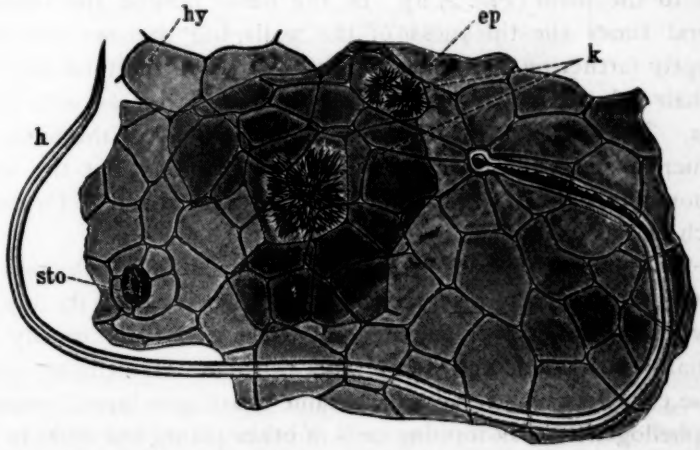

FIG. 2.—Strawberry receptacle in surface view. Ep, epidermis with h, hair and sto, stoma; hy, hypoderm; k, klucoside (?) crystals. × 160.

also well preserved. The calyx, the stamens and a portion of the pith are removed in preparing the fruit for the table.

Histology.—Kraus,[1] in 1866, noted the general microscopic structure of the pericarp, and Tschierske,[2] in 1886, made an exhaustive study of the structure and development of the pericarp, endosperm, receptacle and style. Neither author describes the structure of the testa. Blyth[3] gives the shape and dimensions of the achenes and

[1] Ueber den Bau trockner Pericarpien. Pringsheim Jahrbücher, 5, 83–126.

[2] Beiträge zur vegleichenden Anatomie und Entwicklungsgeschichte einiger Dryadeenfrüchte. Ztschr. f. Naturwissenschaft, 59, 594–600.

[3] Foods: Their Composition and Analysis, London, 1896, 161.

refers briefly to the histology of some of the tissues found in jam, but does not mention the styles and hairs, which are the elements of chief importance in diagnosis. Marpmann[1] describes some of the seed tissues and gives a cut illustrating their appearance in surface view.

In microscopic structure the cultivated, the wood and the Virginian strawberries are identical.

Receptacle.—(1) The Epidermal Cells (*Fig. 2*, ep) for the most part are polygonal and isodiametric, but those radiating from the base of each hair are usually irregularly diamond shape, and often are strongly elongated. The hairs are not numerous, but are often over a millimeter long, tapering gradually from the widest part near the base to the point (*Fig. 2*, h). In the basal portion the lumen is several times the thickness of the walls, but narrows somewhat abruptly further on, and for fully three-fourths of the total length of the hair is but a narrow channel hardly one-quarter as wide as the walls. The walls, on the other hand, are narrowest at the basal end. Tschierske states that stomata are entirely wanting, but the writer has found them in all the specimens of *F. Chiloënsis* and *F. Virginiana* which he has examined.

(2) Hypoderm or Sarkogen Layer (*Fig. 2*, hy).—Tschierske has shown that the fleshy receptacle of the strawberry owes its origin to a hypodermal layer of meristematic cells, which are mostly tangentially elongated, and are always without intercellular spaces. These cells, to which he gives the name "sarkogen layer," resemble the phellogen or cork-forming cells of other plants, but differ in that the new cells are formed centripetally, and remain active during the whole period of growth; whereas the cork cells are formed centrifugally, and die soon after formation. The cells increase in size in radial directions, and divide by tangential partitions. After they have performed their mission, they continue to increase in size, but hold to their original shape.

(3) Cortical Tissue.—The daughter cells formed by the division of the cells of the sarkogen layer increase rapidly in size, become round in shape, and form intercellular spaces. This tissue forms the bulk of the ripe fruit. Each cell is rich in contents, which, on cooking or treatment with alcohol, yields a shriveled, opaque mass.

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[1] Ztschr. f. angew. Mikroskopie, 1896, 2, 97.

(4) Bundles.—Spiral and annular vessels from 0·005 to 0·010 millimeter in diameter, and thin-walled, elongated cells, are the conspicuous elements of the bundles.

(5) Pith.—Large berries often contain large intercellular spaces or cavities in the pith, formed by the tearing asunder of the cells during the rapid growth.

Pericarp.—(1) Epicarp (*Fig. 3*, epi).—Seen in surface view, the cells are polygonal, 0·015 to 0·05 millimeter in diameter, with thin walls; but in transverse or longitudinal section, they are rectangular and about 0·02 millimeters thick. The cuticle is several times as thick as the radial walls of the cells.

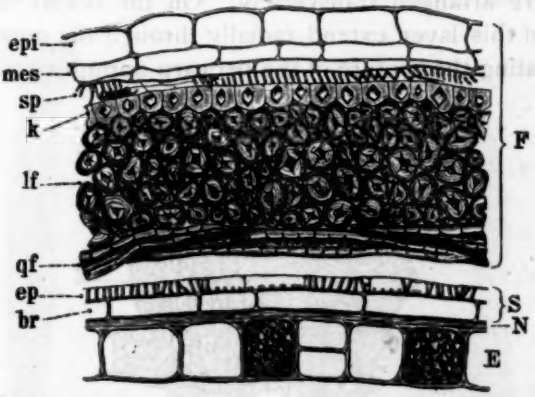

FIG. 3.—Strawberry achene in transverse section. F, pericarp consisting of epi, epicarp, mes, mesocarp, sp, spiral vessels, k, crystal layer, lf, outer endocarp with longitudinally extended fibres, and qf, inner endocarp with transversely extended fibres; S, testa consisting of ep, epidermis with reticulated cells, br, elongated brown cells; N, hyaline layer (nucellus); E, endosperm consisting of a single layer of aleurone cells. × 300.

(2) Mesocarp (*Fig. 3*, mes). This layer is strikingly different from the mesocarp of most edible fruits in that it is not succulent, and consists of only one, or in some parts two, cell layers. In cross section the cells have much the same appearance as the epidermis cells, but usually have smaller dimensions. On the inner side are numerous bundles, the branches of which run transversely about the achene.

(3) Crystal Layer (*Fig. 3*, k).—Kraus described this layer as made up of two cell layers; Tschierske, however, pointed out that it is in most cases made up of but one. The cells are polygonal isodiametric,

from 0·008 to 0·020 millimeter in diameter. The monoclinic crystals are always simple, and are especially striking when illuminated with polarized light. The diameter of each crystal is about half that of the cell in which it is contained.

(4) Outer Endocarp (*Fig. 3*, lf).—This layer, forming the larger part of the pericarp, is made up of five or more thicknesses of sclerenchymatous fibers longitudinally arranged. As seen in cross section, the cell walls are about as thick as the diameter of the lumen. The pores are clearly evident in longitudinal section.

(5) The Inner Endocarp (*Fig. 3*, qf) consists of the same elements as the outer endocarp, but is only one or two cell layers thick, and the cells are arranged transversely. On the dorsal side some of the fibers of this layer extend radially through the outer endocarp, thus facilitating the rupture of the pericarp during sprouting.

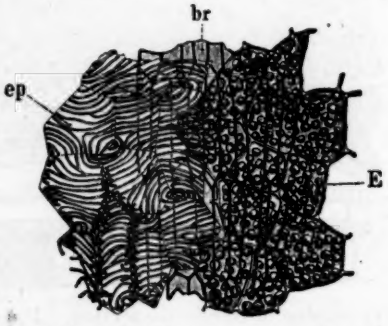

FIG. 4.—Strawberry testa and endosperm in surface view. Signification of letters same as in Fig. 3. × 300.

Testa.—(1) The Epidermis (*Figs. 3* and *4*, ep) is made up of thin-walled cells, which in surface view are polygonal, in section quadrilateral. The cell walls are exceedingly thin, but are strengthened by thickened bands, resembling those of spiral and recticulated vessels. They differ, however, from the latter in that they do not pass completely around the cell, but are wanting on the outer surface, so that in mounting a preparation the outer wall often collapses and the side walls fall down, presenting the appearance shown in *Fig. 4*. This layer is difficult to make out in cross section, but is readily studied in surface view.

(2) Brown Layer (*Figs. 3* and *4*, br).—The second layer of the testa is composed of elongated brown cells, which pass transversely about the seed. Transverse sections of these cells are quadrilateral,

with radial walls about 0·006 millimeter long. As seen in surface view, they are pointed, and often are arranged side by side in rows. They vary up to 0·10 millimeter in length, and usually between 0·010 and 0·015 millimeter in width.

Nucellar Layer (*Fig. 3*, N).—This coat consists for the most part of obliterated cells, forming a cellulose layer from 0·002 to 0·004 millimeters thick, but on the ventral side the cells are often well defined.

Endosperm (*Figs. 3* and *4*, E).—Transverse sections show that the endosperm is but one cell thick, although here and there a cell is divided by a tangential partition, forming twin cells. Seen in surface

FIG. 5.—Strawberry style and stigma. × 32.

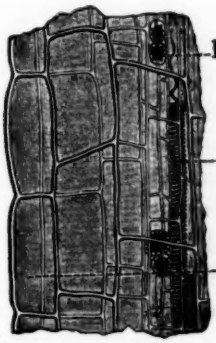

FIG. 6.—Strawberry style in surface view. ep, transparent epidermis; sp, spiral vessels; k, crystal cells. × 300.

view the cells are triangular, square or polygonal. In glycerine mounts of fresh or alcoholic materials irregularly spherical aleurone grains are evident. In nearly every point these cells resemble the aleurone layer of the cereal grains.

Embryo.—Two large cotyledons, each in cross section semi-elliptical, make up the bulk of the embryo. They are built up of thin-walled cells, much the same as in the cotyledons of many other seeds, and contain protein and fat, but no starch.

Style and Stigma (*Figs. 5* and *6*).—The strawberry style is distinguished from the styles of other edible rosaceous fruits by its constricted base and the large size and transparency of the epidermal

cells. The styles are about 0·3 millimeter in diameter in the middle part, but taper somewhat toward the stigma, and very markedly toward the base, where they are less than 0·1 millimeter in diameter. The epidermal cells (ep), which may be readily studied without sectioning or treatment with reagents, are for the most part about 0·04 millimeter wide, 0·10–0·15 millimeters long, and (as may be seen on the margins, by focusing) 0·05 millimeter thick. The central core appears darker than the transparent margins, owing to the greater density of the parts as well as to the greater thickness. Treatment with potash discloses spiral and annular vessels and rows of accompanying crystal cells (k), each containing a crystal cluster. The stigmas of rosaceous fruits are studied with difficulty owing to the fungous growths, which often completely hide the papillæ, even after treatment with reagents or cooking.

Examination of Strawberry Preserves.—The styles and achenes may be readily picked out with forceps and examined as to their size and shape, under a simple lens. The former, transparent in the fresh fruit, and rendered still more transparent by the boiling with sugar, may be studied under the compound microscope without further treatment. Their size (2 millimeters long), narrow base and large transparent epidermal cells, are especially characteristic; but the spiral vessels accompanied by crystal clusters, and the stigma, often bristling with fungous threads, further aid in the identification. Crystals are clearly differentiated by the aid of polarizing apparatus.

For the study of the pericarp and seed, cross sections should be prepared, holding the achene between pieces of soft wood or in a hand-vise during the cutting. Especially striking are the two endocarp layers made up of sclerenchymatized fibers, running longitudinally in the outer, transversely in the inner layer, the endosperm made up of a single cell layer and the relatively large embryo. The testa with adhering endosperm may be isolated after cutting open the pericarp and studied in surface view under a compound microscope. The reticulated cells of the outer layer are highly characteristic.

In mounts prepared by placing on a slide a portion of the jam freed from seeds, and pressing it into a thin film with a cover glass, may be seen the tissues of the receptacle, of which the long, pointed, thick-walled hairs and the long strands of vascular elements are of diagnostic value. Debris resulting from the disintegration of the cortical parenchyma cells with their shriveled contents forms a considerable part of the jam, but has little use in identification.

THE RED RASPBERRY.

Rubus Idaeus L. occurs native in various parts of the Old World, and is the parent of the raspberries cultivated in European gardens.

Bailey[1] states that the red raspberries cultivated in America are offspring of the native *R. strigosus* Michx., which, however, is closely related to the European raspberry *R. Idaeus* L. The yellow varieties are but albino forms of these species. A red variety of *R. Idaeus* grown in England, several red and yellow garden varieties of *R. strigosus* grown in New Haven, were studied by the writer, and were all found to be practically identical both in macroscopic and microscopic structure.

Macroscopic Structure.—The raspberry, blackberry and other bramble fruits (*Rubus*) are intermediate in both macroscopic and

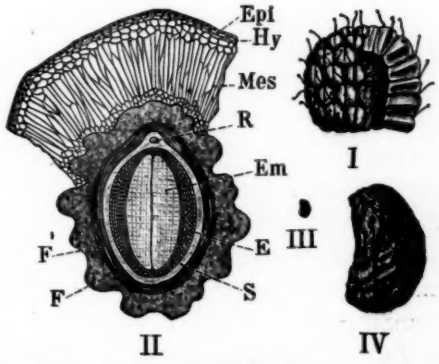

FIG. 7.—Red Raspberry. I Compound fruit, × 1. II Transverse section of a drupelet, × 32. Epi, epicarp; Hy, hypoderm; Mes, mesocarp; F, outer endocarp; F′, inner endocarp; S, testa; R. raphe; E, endosperm; Em, embryo. III Stone, × 1. IV Stone, × 8.

microscopic structure between the strawberry (*Fragaria*) and the stone fruits (*Prunus*). They resemble the strawberry in that they are compound fruits with numerous individual fruitlets on a common receptacle (although unlike the strawberry, the cortex of the receptacle is not fleshy, and bears the fruitlets on elevations, not in depressions); and they resemble the stone fruits in the structure of the pericarp and seed, each individual fruitlet being in fact a miniature drupe. The resemblance between the raspberry drupelet and the peach is especially striking. In both the epicarp is pubescent,

[1] *Loc. cit.*, p. 287.

the mesocarp is fleshy, the endocarp (*Fig.* 7, III and IV) is a hard stone with wrinkles on the surface, and the united testa and endosperm form a thin coat for the relatively large embryo. They are also very similar in histological structure, as is noted further on.

The drupelets are crowded together on the top and sides of the receptacle, each having a convex top or exposed surface and four to seven facets on the sides formed by the pressure of the adjoining drupelets (*Fig.* 7, I). These facets are usually slightly convex or concave. Owing to their crowded arrangement, the thickness of the flesh in the sides of the drupelets is much less than in the outer part. The exposed surface and the angles between the facets are pubescent, the facets themselves glabrous. In picking a raspberry the drupelets separate from the receptacle, clinging together in the form of a cup. Tschierske states that the individuals cling together, first, because of the closely fitting adjoining facets, the slightly convex surface of one fitting into a corresponding concave surface of another; and, second, because of the interlocking of the crooked hairs. The style is about 4 millimeters long and arises from the upper edge of the exposed surface of the drupe, appearing to come from between the drupelets.

Histology.—Tschierske[1] gives a valuable description of the structure and development of the pericarp, endosperm and style of the European *R. Idaeus*, but (as in the case of the strawberry) neglects the testa. Marpmann[2] gives a short description of some of the tissues. Villiers and Collin[3] describe briefly the microscopic appearance of the style and fragments of epicarp as seen in the jelly, illustrating their description with an inaccurate cut.

Receptacle.—(1) The Epidermis resembles somewhat the epicarp of the fruit, but the hairs are less numerous and usually thicker walled.

(2) Cortex.—As no sarkogen layer is developed in the raspberry the cortex layer is thin, the bulk of the receptacle being the pith.

(3) Bundles.—It follows from what has been stated that the main bundles run near the surface of the receptacle. They are shorter and more strongly developed than in the strawberry, with larger and more numerous vessels.

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[1] *Loc. cit.*, pp. 612–628.

[2] *Loc. cit.*, 102.

[3] Traité des Altérations et Falsifications des Substances Alimentaires, Paris, 1900, 829.

(4) The Pith consists of round parenchyma cells, devoid of cell contents, with intercellular spaces.

Pericarp.—(1) The Epicarp or Epidermis (*Fig.* 7, Epi, *Fig.* 8) on the facets of the drupelets consists entirely of polygonal cells, but on the exposed surfaces consists of polygonal cells and hairs, the hairs often being so numerous that they occur at two to four of the angles of the polygonal cells. Five or six cells frequently meet at the base of the hair, forming a rosette about it. The hairs vary greatly in length, up to 0·7 millimeter. Most of them have thin walls (0·0005 to 0·0015 millimeter) of nearly uniform thickness from the base to the blunt apex, and show a broad lumen (h); but some of the longer forms have thick walls and a narrow lumen resembling the strawberry hair (h′) The thin-walled hairs are commonly sinuous.

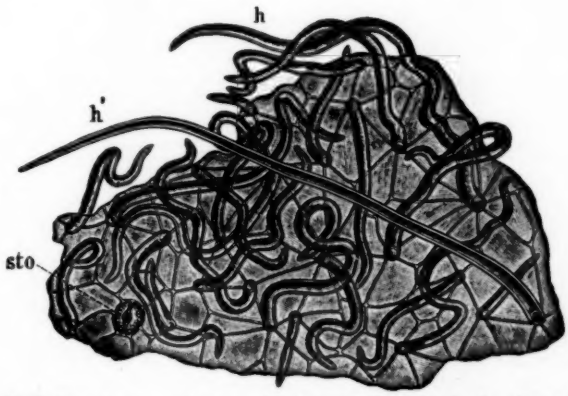

FIG. 8.—Red Raspberry epicarp with h′, straight hair, h, sinuous hairs and sto, stoma. × 160.

(2) Hypoderm (*Fig.* 7, Hy).—Two or more cell layers of collenchyma form the hypoderm (a water tissue), serving to retard the evaporation of the fruit juice.

(3) Mesocarp (*Fig.* 7, Mes).—The outer two or three layers of the mesocarp consist of isodiametric cells with intercellular spaces, interspersed with crystal cells; but further inward, at least in the thicker portion of the fruit, the cells are enormously elongated in radial directions and are without intercellular spaces. Tschierske points out that the succulent nature of the fruit results from the radial growth of cells, not as in the strawberry from the formation of numerous isodiametric cells by a meristematic layer.

As in all the species of *Rubus*, cells with crystal clusters are common, particularly near the base of the style. Reticulated cells occur in the inner layers adjoining the endocarp.

(4) Outer Endocarp (*Fig.* 7, F, *Fig.* 9, lf).—Owing to the deep wrinkles the thickness of this coat is exceedingly variable. As in

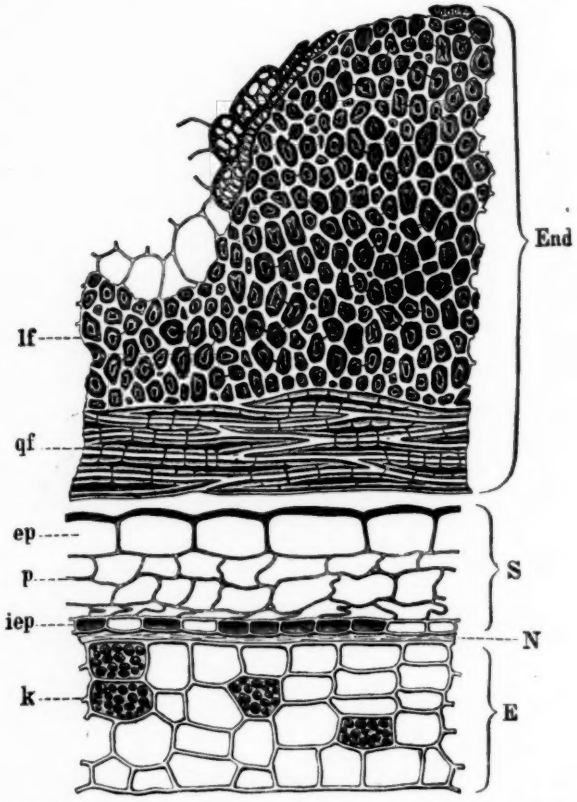

Fig. 9.—Red Raspberry. Endocarp and seed in transverse section. End, endocarp consisting of lf, longitudinall extended fibers, and qf, transversly extended fibers; S, testa consisting of ep, epidermis, p. parenchyma (nutritive layer) and iep, inner epidermis; N, hyaline layer (nucellus); E, endosperm with k, aleurone grains. × 320.

the strawberry, the sclerenchyma fibers are longitudinally arranged and cross those of the inner endocarp at right angles. The fibers are a little narrower than in the latter fruit, and in cross sections are usually elliptical-polygonal, with the longer diameters in radial directions.

The writer finds that the walls of these fibers are made up of two thickened layers, an outer or secondary membrane and an inner or tertiary membrane, the two differing greatly from each other in their refractive power and their deportment toward reagents. As the middle lamella is inconspicuous, the double outer membranes in transverse sections form a net-work like that of ordinary thick-walled polygonal cells. The thickness of this double outer membrane is about the same as the thickness of the inner membrane and the diameter of the cell lumen. Zinc chloride iodine stains the outer membrane yellow, the inner blue; and safranin also serves to differentiate the two layers. In longitudinal section numerous pores passing through both membranes are evident. This interesting structure of the raspberry fibers, similar to that of the bast fibers of various plants,[1] appears to have escaped the attention of investigators.

(5) Inner Endocarp (*Fig.* 7, F[1], *Fig.* 9, qf).—The fibers of this coat, of which there are four or more thicknesses, are the same as in the outer endocarp, but run transversely about the fruit.

[*To be continued.*]

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE LITERATURE RELATING TO PHARMACY AND MATERIA MEDICA.

By M. I. Wilbert,
Apothecary at the German Hospital, Philadelphia.

Not for many years has there been so much evidence of concerted, as well as individual, effort to improve the status of pharmacy in English-speaking countries, as at the present time.

In our own country the adoption of the prerequisite law, by the State of New York, is probably the event of greatest moment. This law carries with it not alone the requirement of graduation from a college of pharmacy, but also requires a certain amount of preliminary education on the part of the applicant. While it is true that this latter requirement has been made comparatively low, it will, nevertheless, compel colleges of pharmacy who expect to draw students from New York State, or whose students expect to come up for the examinations of the New York State Board of Pharmacy, to institute entrance examinations that will correspond to the pro-

[1] See Tschirch, Angewandte Pflanzenanatomie, 1889, pp. 189–190.

visions of the New York State law. So that, in this one instance alone, the effects of the law, apart from being of advantage as a precept, are directly of advantage by virtually compelling colleges of pharmacy in other States to conform their entrance requirements with the provisions of the New York State law for preliminary education.

Another promising indication of improvement is in the broadening influence that must necessarily result from the amalgamation of colleges of pharmacy with the greater and more influential universities. Following the example that was set by the College of Pharmacy of the City of New York, the Maryland College of Pharmacy has recently become the Department of Pharmacy of the University of Maryland. In this latter instance it would appear that the union is even closer and more complete than in the former. The professors of the college of pharmacy have been elected professors of the university and the coming course of lectures is to be given in the university buildings.

The influence that the university environment must necessarily have on the students, apart from any improvement in the curriculum of the school, will prove of value in giving them a broader and better outlook and in improving and enlarging their circle of acquaintance.

In Great Britain the agitation for university degrees for students of pharmacy is about to bring satisfactory results. The court of the Victoria University, Manchester, has decided to provide for a suitable course for the degree of B.Sc. in Pharmaceutics. The degree will be the equivalent of the degree of Bachelor of Science in ordinary, but will include studies particularly adapted to the needs and wants of pharmacists. (*Phar. Jour.*, May 24, 1904, page 678.)

The great Scottish universities are also considering the problem of providing suitable courses of instruction and of granting degrees in pharmacy. It is proposed to institute a Bachelor of Science in Pharmacy degree, carrying with it all of the privileges of the Bachelor of Science degree in ordinary, and leading up to a Doctor of Science degree at the end of five years.

On the Continent of Europe probably one of the most interesting events of the last few months was the retirement from active teaching work of Prof. Dr. August Ritter Vogl v. Fernheim, professor of pharmacology and pharmacognosy in the University of Vienna,

who is frequently alluded to as the father of pharmacology. On July 2, 1904, Professor v. Vogl was tendered a public ovation, on which occasion he was also made the recipient of a "Festschrift." Professor v. Vogl has been connected with the University of Vienna for forty years as a teacher and for thirty years as the director of the Pharmacological Institute. Much of his work has been done along pharmacognostic lines, and his publications in this particular field are numerous indeed, including, as they do, an uninterrupted series since 1853. Professor v. Vogl's efforts to advance our knowledge of plant structure has been repeatedly recognized. He was the recipient of the Flückiger medal in 1894 and of the Hanbury medal in the following year (1895). Among the numerous scientific societies that have elected him to honorary membership the Philadelphia College of Pharmacy is not the least. This institution elected him in 1893 as a corresponding member and at the annual meeting of the college in March, 1904, he was elected an honorary member of the same institution.

Repeating Prescriptions.—The unauthorized repetition of prescriptions has been the occasion of considerable correspondence that has been published in the *British Medical Journal.* This published correspondence has caused the Medico-legal Committee of the British Medical Association to propose a set of resolutions to be discussed and acted on at the meeting of that association at Oxford. The committee appear to believe that it will be necessary to bring about some changes in the existing legislation and recommend that the Pharmaceutical Society be approached with a view of having a conference on the subject. The further recommendations of the committee propose that the physician indicate on each prescription a time limit and the number of times that it is to be refilled, and that the dispenser be obliged to duly stamp each prescription every time it is dipensed and to refuse to refill the same after the indicated number has been reached or the indicated time limit has expired. (*Chem. and Drug.*, May 14, 1904, page 780.)

The metric system of weights and measures is still attracting considerable attention, in one way or another, both in this country and in England. The *Pharmaceutical Journal* (June 9, 1904, page 797), in an editorial note, says: "Our American correspondent states that the action of the pharmacopœia authorities in ruling out every other system but the metric has had the effect of making the "U.S.P."

more or less impractical. The experience is particularly interesting, in view of the expressed willingness of the General Medical Council to make the metric system the only system of weights and measures official in the coming edition of the British Pharmacopœia."

Acetanilid is reported in several of the German pharmaceutical journals as being at times contaminated with acet-toluidin, and it is recommended to test doubtful samples of this possible admixture.

Antiseptic Paper.—A recent German patent covers the addition of various antiseptics to paper pulp before the same is passed through the machine. The proposed uses are for wrapping, or protecting, readily decomposed articles or food stuffs. The antiseptics that have been used in this way are boric acid, salicylic acid and thymol. (*Phar. Zeit.*, 1904, page 461.)

Cellotropin-mono-benzoyl-arbutin is recommended as a remedy in tuberculosis and scrofula. Cellotropin is prepared by the interaction of arbutin and benzoyl chloride, and forms a tasteless and odorless powder, insoluble in most organic solvents and only slightly soluble in water and in alcohol. Under the influence of hydrolytic agents it is decomposed into benzoic acid, hydroquinone and glucose. (*Phar. Jour.*, June 23, 1904, page 1001.)

Cod-liver Oil.—A market report in the *Pharmaceutical Journal*, (June 11, 1904, page 818) notes that the production of cod-liver oil in Norway during the past season amounts to an aggregate of 12,770 barrels, as against 2,300 barrels in 1903. While the figures for 1904 show a decided increase over the abnormally low yield in 1903, they are still far below the aggregate of previous years. The amount produced in 1901, for instance, being 28,210 barrels.

Gallogen.—This is a trade name for ellagic acid. It is obtained by heating a mixture of gallic acid and iodine. It may also be obtained by extracting the pods of divi-divi with alcohol, and precipitating the alcoholic extract with water. The precipitate contains ellagic-gallic acid that on heating to 110° C. is converted into ellagic acid.

Gallogen is an odorless, yellowish, crystalline powder, insoluble in neutral or in acid liquids, but readily soluble in alkaline liquids. It is almost insoluble in ether, and is only slightly soluble in alcohol. Gallogen has been suggested as an active and reliable intestinal astringent, and is to be given in doses of from ·30 to ·60 four to six times a day (*Apoth. Zeitg.*, 1904, page 178).

Iodylin.—Iodo salicylate of bismuth is a stable, light-gray powder that has been recommended as an odorless, non-toxic and non-irritating substitute for iodoform. The preparation is said to be useful in suppurating and granulating wounds, as a dusting powder, and is not followed by any of the untoward results that frequently accompany the use of iodoform. (*Phar. Post*, 1904, page 292.)

Isopral.—Trichlor-isopropyl alcohol, a crystalline body freely soluble in water. It is said to be an efficient hypnotic, resembling in this respect chloral hydrate, chloretone and trichlor-ethyl alcohol. Isopral is said to be more efficient and less toxic in its action than chloral hydrate. It may be given in doses of ·50 to ·75. (*Phar. Post*, 1904, page 292.)

Lecithin.—This name is applied to a number of organic combinations of phosphorus that occur in animal as well as in plant structures, usually as more or less complex derivatives of glycerinophoshoric acid. Lecithin occurs in the blood of animals, in the yolk of eggs, in the sperm of mammals and in the milt of fish; also in a number of seeds of plants—particularly in those of the Graminaceæ. The commercial varieties of lecithin are most frequently prepared from the yolk of eggs. It usually occurs as a white, hygroscopic substance, more or less soluble in alcohol, chloroform, or ether, but insoluble in water. It has been prepared, and may be given, in a number of ways, and is indicated in all affections where the use of phosphorus would be of advantage. The literature on lecithin, particularly in Germany, is quite extensive, and is rapidly accumulating.

Lactucon.—This substance has been isolated from lactucarium; it is odorless and tasteless, and is insoluble in hot or cold water. Lactucon is soluble in ether, benzol, benzine, chloroform, carbon disulphide and hot alcohol, but only slightly soluble in cold alcohol. It has a melting point of 184° C., and occurs in small acicular crystals. According to E. Sperling, it has the chemical formula $C_{23}H_{36}O_2$. (*Phar. Zeitg.*, 1904, page 310.)

Maretin, methylated acetanilid.—This occurs as a white crystalline compound, melting at 183° or 184° C. It is soluble in 1,050 parts of water, and only slightly soluble in ether, chloroform or alcohol. Maretin possesses antipyretic properties, and may be given in doses of ·20 three times a day. (*Süd. Deut. Apoth. Zeitg.*, 1904, page 432.)

Oxalic acid as an expectorant; V. Poulet has used oxalic acid as

an expectorant, in asthma, bronchitis and similar affections, with satisfactory results. He recommends the following:

Acid oxalic	2·00
Infusion of tea	190·00
Syrup of orange peel	75·00

Mix.

One teaspoonful every hour. (*Apoth. Zeitg.*, 1904, page 71, from *L'Union Phar.*)

Phytin.—Acid magnesium and calcium hydro-oxy-methylene-diphosphate is said to contain 22.8 per cent. of plant phosphorus in organic combination. (*Phar. Centh.*, 1804, page 376.)

Neuronal.—Brom-diethyl acetamide; has been recommended as an efficient hypnotic. It is given in doses of from ·50 to 1·50, followed by a hot drink—preferably a cup of tea.

Salite.—A salicylic acid ester of borneol; is an oily liquid, insoluble in water and only slightly soluble in glycerin, but is readily soluble in alcohol, ether or the fixed and volatile oils. Salite is decomposed by alkalies into salicylic acid and borneol. It has been used, mixed with equal portions of olive oil, as an external application in articular rheumatism and in neuralgia. (*Phar. Post*, 1904, page 386.)

Stagnin.—A substance prepared from the spleen of animals; occurs as a yellowish-brown water-soluble powder. The preparation has been used with some success to increase the coagulability of the blood, and it is presumably from this action that it has derived its name. (*Phar. Centh.*, 1904, page 438.)

Vioform.—Iodo-chlor-oxy-chinoline occurs as a grayish-yellow powder, perfectly stable in air, tasteless and nearly odorless. Among other advantages that are claimed for this iodine preparation is the fact that it may be heated to 100° C. for an hour or more without decomposing it in any way. Vioform has been recommended as an efficient substitute for iodoform. (*Phar. Centh.*, 1904, page 240.)

CORRESPONDENCE.

ENTRANCE REQUIREMENTS FOR COLLEGES OF PHARMACY.

In view of the importance which the subject of entrance requirements has assumed in various institutions of learning in recent years, and more especially as the subject will come up for consideration at

the next meeting of the Conference of Pharmaceutical Faculties, at Kansas City, in September, the editor of this JOURNAL invited the attention of various teachers in pharmaceutical schools and colleges to a paper by Prof. W. M. Searby in the August issue of this JOURNAL, and asked them to discuss the subject. The time seems ripe for the *discussion* of this fundamental problem in pharmaceutical education, and it is hoped that the time is not far distant when concerted action on this question can be taken, not only by schools of pharmacy but by boards of pharmacy as well.

The following are the replies which have been received:

AUGUST 5, 1904.

To the Editor of the AMERICAN JOURNAL OF PHARMACY:

Referring to the article in the August issue of your JOURNAL, written by Prof. W. M. Searby, concerning entrance requirements in schools of Pharmacy, I wish to say this:

High-school graduation or its equivalent cannot be made an entrance requirement of schools of pharmacy without the aid of the boards of pharmacy. A great majority of the students that attend the pharmaceutical schools come from the drug stores. The young men that enter the drug-stores are not high-school graduates, and they never will be until the boards of pharmacy, in their wisdom, insist upon it.

I believe that of the apprentices in the drug-stores only a small proportion have more than a grammar-school education. Surely the better educated among those boys are the ones who go to the pharmaceutical schools, and only a very small proportion of those who go to the pharmaceutical schools in general seem to attend those schools that require high-school graduation or its equivalent as a condition of entrance. The great bulk of the college students of pharmacy evidently attend the schools that have not yet established any higher entrance requirements than the education necessary for admission to the high school.

This question has been discussed in the American Pharmaceutical Association and the pharmaceutical journals for fifty years, and a further discussion of it will certainly continue to be fruitless unless it takes a new direction. I am decidedly of the opinion that whenever the boards of pharmacy conclude that high-school graduation is one of the necessary qualifications of pharmacists, all the pharma-

ceutical schools will gladly adopt high-school graduation as a condition of admission, and that they will not do so under any other circumstances, because they cannot.

In this school only about one-third of the students have a completed high-school education or its equivalent, only two-thirds have had as much as two years' high-school work, and the remainder have been admitted to high school or have had one year of high-school work. Completed high-school work is required for the course leading to the degree of Pharmaceutical Chemist, but if we should require that grade of preliminary education of all our students it is absolutely certain that all students who do not have a high-school education would simply be driven into other pharmaceutical schools and nothing would be gained by such a course, as no distinction is made on the basis of general education when these young men present themselves before the boards of pharmacy for examination and registration. They would all remain in pharmacy.

Good general education is, to my mind, of far greater importance in our efforts to advance pharmaceutical education than either special education in the schools of pharmacy or the training in the shops, because it lies at the bottom of all, and wherever the foundation is poor the structure will be correspondingly weak.

I have for many years felt that the pharmacy laws confer vast discretionary powers upon the boards of pharmacy which the boards have never used. The boards have it in their power to insist upon adequate preliminary education before the examinations they hold and before issuing licenses. Probably the boards have not held this view or perhaps they have not even thought of it. If at the approaching joint conference of the State boards of pharmacy and the conference of pharmaceutical faculties this question should receive full consideration, I believe that the boards of pharmacy may be expected to establish a much better standard of general education for admission to the ranks of pharmacy than is now prevailing, and I also believe that the schools of pharmacy will do all that the boards of pharmacy see fit to prescribe, and probably much more.

The responsibility for the low standard of education in pharmacy, as compared with that in other professions, certainly rests with the boards of pharmacy and not with the colleges. The pharmacy laws uniformly require the boards to examine into the qualifications of the candidates for registration and to register only those whom they

find fit. I do not believe that it is too much to expect that these laws be so construed as to require at least two years of high-school work immediately and full high-school graduation within five years, as a preliminary to registration by the boards, and whenever the boards so decide the good schools of pharmacy may be depended upon to conform.

There is no civilized country in the world requiring less than high-school graduation or its equivalent for admission to the ranks of pharmacy except England and America, and I am sure that America is ripe for a decided step forward. There will be no objection on the part of druggists in business, who, as employers, are financially interested in this subject, for while it is probably true that the wages of drug clerks will be somewhat increased if none but high-school graduates can ultimately become full-fledged pharmacists, it is also true that the number of druggists will not grow as rapidly as in the past, and druggists already registered and in business will not object to having competition diminished.

Yours truly,

OSCAR OLDBERG.

NORTHWESTERN UNIVERSITY.

AUGUST 9, 1904.

DEAR SIR:—I endorse practically all of Professors Searby's article on "Entrance Requirements," which appeared in the August number of the AMERICAN JOURNAL OF PHARMACY. The entrance requirements should not fall below an education equivalent to that obtained from a good high school. Now is as good a time for a universal movement that way as any. Let us do it voluntarily before we are forced to it by the other professions or have lost our prestige. Pharmacy is a young profession, and it has gained much in the eyes of the public. We must move along with other professions, or we will lose what has been gained.

The thing that has impressed me more than anything else, perhaps, is the scarcity of good clerks. Calls come repeatedly from all over our land for good clerks, and the supply does not meet the demand. I believe that if the colleges required their students to have a high-school education, or its equivalent, before entering college, that this demand would be met. I believe that we are going to see better times for the drug clerks—I mean good clerks—and for professional pharmacy.

I am optimistic enough to believe that if those colleges who are now requiring a high-school diploma, and those who are now willing to require it, in three or four years would come together, the number would not be so small as some think, and that other colleges would fall into line, either from choice or necessity. I hope that some definite action will be taken at the Kansas City meeting.

Yours very truly,

E. A. RUDDIMAN.

VANDERBILT UNIVERSITY.

AUGUST 10, 1904.

MY DEAR PROFESSOR:—Your request of recent date came during my absence from the city, hence the delay in the reply.

I am heartily in accord with the resolutions which Dean Searby, or Dr. Schneider, intend to introduce for adoption at the conference at Kansas City.

This college, during its twelve years' existence, has demonstrated that the requirements of a full four-years' high-school training as a prerequisite to entrance to a college of pharmacy, is feasible. For the past six years our student-body has been made up of more than 90 per cent. of full four-year high-school graduates. Prior to that the percentage fluctuated between 75 and 88 per cent. The 10 per cent. that are not high-school graduates have nearly all an academic training equal to a high-school training. A dozen years ago we accepted only about 40 per cent. of the applicants for admission. I made successful efforts to inform the pharmacists of the State that we would, from year to year, increase our entrance requirements to a point where nothing less than a full four-year high-school training, or its equivalent, would be accepted. This warning, which I have since kept fresh in the minds of pharmacists and prospective students, has resulted greatly to the advantage of pharmacy in this State, inasmuch as the percentage of applicants that had to be rejected each year has steadily grown less. Of our seventy students of two years ago, sixty-five were high-school graduates, and of our sixty students last year fifty-four were high-school graduates. Those that were not high-school graduates were required to enter upon our three-year course and to carry certain academic studies in their first year, so that their preliminary training would equal that of the average of our students.

This progress was made in the face of strenuous opposition.

One of the most important results of this adherence to a high standard is the undoubted fact that we attract students of a higher calibre and standing than we would if our standard were lower. The students of this department are, as far as preliminary training, scholarship and general standing are concerned, on a par with those of the other departments of the University. Of course, not all students residing in Minnesota and studying pharmacy are enrolled with us; probably not half.

We, here in Minnesota, are not content, however, with having established the high-school qualification, but we have aimed at the same time to increase the professional requirements; in this we have also been very successful. For the past ten years I have laid the foundation for a law making a college training in pharmacy obligatory for all those who desire to practice pharmacy, and in 1903 I succeeded in having a resolution adopted by our State Association, instructing its legislative committee to take all necessary steps to have such a law enacted when the Legislature meets in January, 1905.

As the Association has always in the past succeeded in having all such laws passed which it favored and in killing all such bills of which it disapproved, we feel quite certain of success.

Very truly yours,

FREDERICK J. WULLING.

THE UNIVERSITY OF MINNESOTA.

AUGUST 11, 1904.

Dear Professor Kraemer:

Your favor of the 1st instant, calling attention to an article in the last issue of the AMERICAN JOURNAL OF PHARMACY by Professor Searby, entitled "When Shall High-School Graduation or its Equivalent be Enforced by Colleges of Pharmacy as a Condition of Entrance," was duly received.

I am in hearty accord with Professor Searby upon the general proposition of higher education as a requirement for entrance into our colleges, but believe the interests of all concerned demand that when first introduced such requirement shall be somewhat less than high-school graduation, for while this standard is most desirable and must ultimately be attained, we must keep in mind the possible effect of too high a standard upon the retail drug trade and guard against a reduction in the number of college graduates as clerks.

I believe we should have as much uniformity as possible throughout the different States; that the regulations should be made through legislative enactment rather than simple agreement; that the original law should not provide for raising the requirements annually, but this important matter be left for consideration after the effect of the first requirements is known, and that the diploma of such colleges as maintain the regulations be required as a prerequisite to examination by a board of pharmacy.

Very truly yours,

WM. C. ANDERSON.

BROOKLYN COLLEGE OF PHARMACY.

AUGUST 11, 1904.

Dear Professor Kraemer:

Would that we could say in answer to Professor Searby's question, "When shall high-school graduation be enforced by colleges of pharmacy as a condition of entrance?" "This instant." Such, I believe, is the feeling of every honest teacher of pharmacy.

But the question is, can we afford such a stand at this moment, when men rejected by the schools because lacking a high-school education, can "bone up" by some other agency, and make the registered pharmacist examination, with no questions asked by the board as to preliminary training?

I am, therefore, forced to answer the query: "Either when none but graduates are permitted to take the registered pharmacist examination, or else when the board demands high-school training of non-graduates."

My views on this subject are set forth at length in the enclosed paper.[1] Sincerely yours,

H. V. ARNY.

CLEVELAND SCHOOL OF PHARMACY.

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[1] *Midland Druggist*, January, 1902, pp. 413–415. In this paper Professor Arny says, among other things: "Let no man be given the registered pharmacist certificate unless he possesses a diploma of a reputable college, one answering all the requirements laid down by the State Pharmaceutical Association. Of course, the candidate must also pass an examination of the board, and the harder this examination is made the better will the conscientious teacher be pleased. This will insure thoroughly educated pharmacists in the new generation; this will lessen the number of druggists and drug stores to the point where the calling will again be one of fair profit."